To the

Honorable Board of Directors

of the

SANTA CLARA VALLEY
WATER CONSERVATION DISTRICT

SUPPLEMENTAL

# REPORT

ON COMPLETION

of the

# 1934 WELL REPLENISHMENT PROJECT

Including

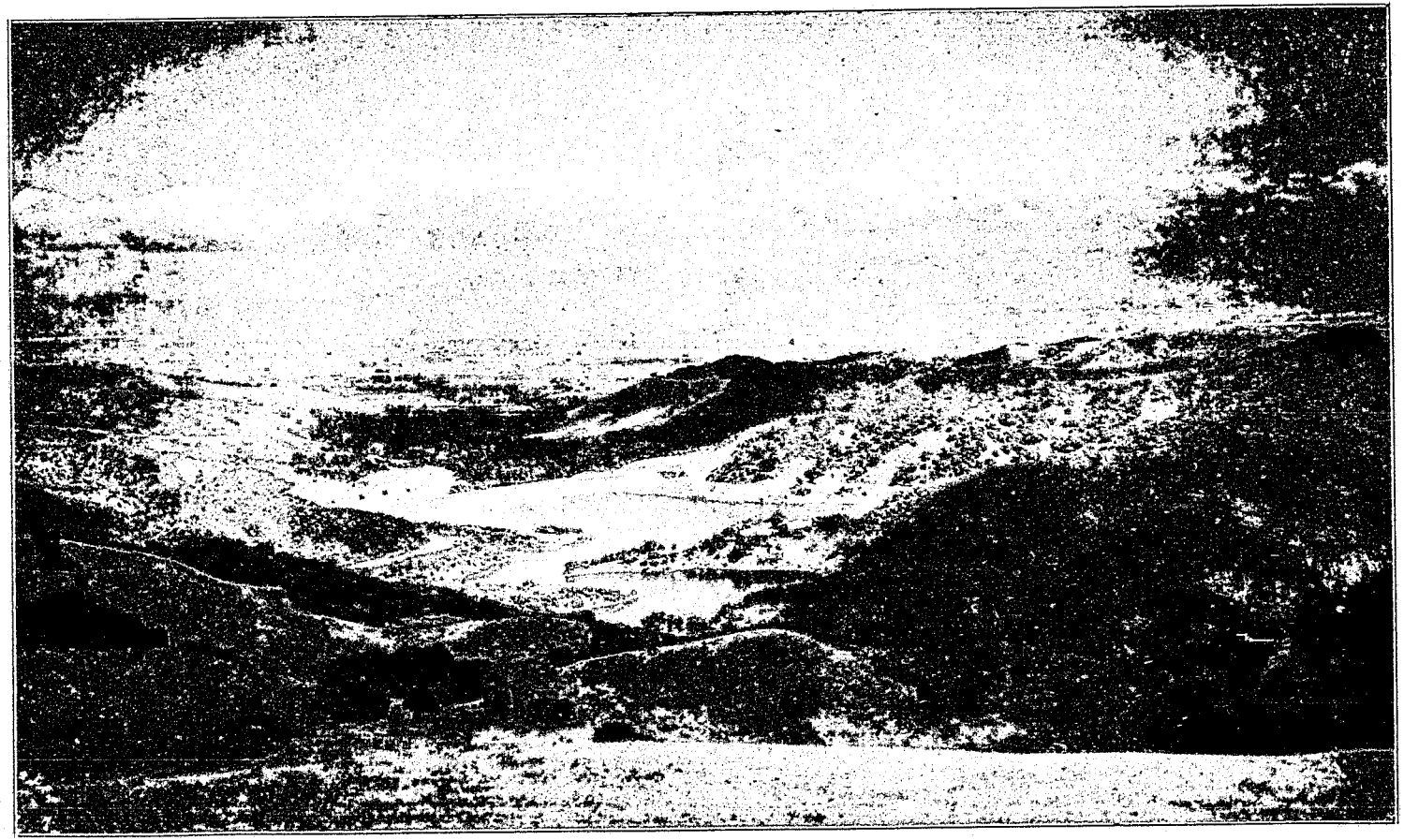
1931 WASTE WATER SALVAGE PROJECT

**Project Report No. 34**

**March 17, 1936**

(Supplemental to 1934 Well Replenishment Project Report of May 8, 1934, including 1931 Waste Water Salvage Report).

Vol 3. pg 828-829



STEVENS CREEK RESERVOIR

Office of
FRED H. TIBBETTS
Chief Engineer
1320 Alaska Commercial Building
San Francisco, California

SUBJECT: SANTA CLARA VALLEY WATER CONSERVATION DISTRICT (P.W.A. 6051) SUPPLEMENTAL REPORT ON COMPLETION OF 1934 WELL REPLENISHMENT PROJECT

March 17, 1936.

The Honorable Board of Directors,
Santa Clara Valley Water Conservation District,
62 Grant Building,
San Jose, California.

Gentlemen:

On March 10, 1936, you directed me to prepare a supplemental report on the additional cost of completing the 1934 Well Replenishment Project, the cost of which cannot be paid for out of the annual revenue of the District. This present report is, therefore, supplemental to our Project Report No. 17, dated May 8, 1934, and adopted by your Honorable Board on the same date, entitled "1934 Well Replenishment Project, Including 1931 Waste Water Salvage Report, Appendix I."

The 1934 Well Replenishment Project sets forth "the works to be constructed and property to be acquired, convenient or necessary to serve and fulfill the purposes for which the District exists." The estimated cost of these works and property was set at a total of $2,683,000. With "financial assistance from the Federal Emergency Public Works Administration to the extent of $683,000. as an outright contribution from the Public Works fund of 30% of the cost of labor and materials" practically assured, a bond election was called on June 19, 1934, in the amount of $2,000,000. This election carried by a majority of about 7 to 1, and actual construction work was begun at once.

The District Engineer's estimate of construction costs was somewhat higher, and a grant was asked of the Public Works Administration in amount of $720,000. A bond issue was then called, under the advice of a Citizen's Advisory Committee, composed of the best informed citizens and financiers of the community, for $2,000,000. Later it developed that the maximum P.W.A. grant allowed was cut to $673,000, and the best estimates now available are that this grant will not yield more than $625,000. or about $100,000 less than originally applied for. It has also developed that the Public Works Administration estimate of the project cost was considerably higher than the funds available and that the Public Works Administration did advise, unfortunately a little too late, that the District vote bonds to the extent of $2,200,000.

Mr. Harry Haehl, eminent Consulting Engineer of San Francisco, with great experience in such works, employed by the District at the request of the Chamber of Commerce, estimated, when the 1931 project was originally proposed, a cost about 10% higher than the funds provided, for the same structures in the 1934 project, as shown in detail in the Waste Water Salvage Report of October, 1931.

## WORK COMPLETED

To date, the construction of the Vasona Dam and Canal, the Stevens Creek Dam, the Guadalupe Dam, the Almaden Dam, the Calero Dam, certain streambed improvements, and about 80% of the Coyote Dam have been completed, except for rights of way necessary to enable the structures to be utilized.

## REMAINING WORK REQUIRED

Although the project, in its present unfinished state, has conserved about two-thirds of the water which would otherwise have run to waste this winter, there still remains considerable work to be done to insure operation under control of the District's two largest reservoirs, the Coyote and the Calero.

The Coyote Dam, in its present unfinished state, cannot be considered safe for the storage of water in a wet season, and the State will not license the structure for use until it is completed according to the original plans. The valves could not be safely closed this year until a considerable portion of the storage space had been vacated, and even then not until close to the end of the rainy season.

The Coyote Canal is still considered necessary, because without it a very considerable portion of our reservoir releases are lost before they reach our District, and there are extensive claims that they also damage some territory without our District. The reservoir releases can be by-passed with nominal transit losses through the proposed Coyote Canal to the head of our District, and thus be conserved for well replenishment within our District. The diversion dam will be so designed that all natural stream flow will continue to pass down the river and only reservoir releases of stored flood water will be by-passed through the canal.

The Calero Reservoir cannot be used until the McKean Road is reconstructed, and before we had it half full this season we were ordered to empty it until we unwatered the road.

## ADDITIONAL FUNDS REQUIRED

All available funds have been used on the work done to date and it is believed essential that additional bonds in the amount of $400,000 be voted and issued to cover the cost of completing the work necessary to make the project workable. There are three important factors contributing to the necessity for additional funds to complete the project so that it will be workable.

These are, first, the large additional cost of the Coyote Dam, the key structure to the entire project, necessitated by the fact that the dam straddles the Hayward fault and will certainly be subject to earthquake disturbances. The final approval of this dam by the State Engineer was held in abeyance for many months, during which time a special Consulting Board composed of two eminent engineers and a geologist with wide experience in the construction of dams made many expensive additions to the design of the structure, finally requiring a structure nearly four times as massive as required for the other dams on this project and, in particular, requiring the dam to be moved from the natural damsite up into the reservoir. Numerous expensive changes were also required during the construction of the dam in the interests of greater safety, and even after the preparation of the dam foundation was completed to the satisfaction of the Engineer of the District and his consulting engineer and geologist on June 30th, a great deal of additional foundation excavation was required by the State, delaying the work and making it more expensive. In addition to this, and contrary to expectations, comparatively little good rock for the rock-fill blanket of the dam was uncovered during the foundation and spillway excavations, so that it finally became necessary to obtain the bulk of the rock-fill from the Larios Canyon quarry about one mile distant, at another great additional expense.

The second major contributing factor to the requirement for additional funds was the additional cost required for rights of way, particularly in the small reservoirs where a large number of expensive improvements had been constructed in recent years by landowners. Relocation of the roads through the reservoirs were also required following more expensive standards than had been originally contemplated.

The third contributing factor to the requirement for additional funds is the fact that it now appears that the Public Works Administration contribution, based upon requirements now in force, will be about $100,000 less than originally requested.

The only other appreciable overrun is in the case of the Almaden-Calero Unit. Both the Almaden and Calero Dams cost appreciably more than estimated in 1934, but the conduit cost far less than originally estimated. The increased cost at Calero was due almost entirely to the State's requiring a much greater amount of foundation excavation for the dam than anticipated.

This condition was true at Almaden also. In addition, it became necessary, after the Almaden embankment was over half completed, to change the location of the dam axis and increase the section of the dam in order to avoid the very strong probability of excessive delay in completion and materially increased costs. The saving on the Almaden-Calero Conduit resulted from a change in location that eliminated the tunnel originally proposed and a complete redesign of the balance. Due to the slow progress made on the unit by the contractors, the costs of field engineering and inspection exceeded the estimated amount but with relatively little effect on the final cost.

On the Guadalupe Unit, construction costs, field supervision and inspection, engineering, legal and administrative expense total approximately 7% less than estimated in 1934. Additional costs of rights of way account for the small increased cost of this unit.

At Stevens Creek the geological formation was in comformity on both sides of the creek and foundation conditions were uniformly good. This permitted a material saving in construction costs of this dam as regards the other sites and also as regards the original estimated cost. In fact, this saving was sufficient to more than offset the very material overruns in both road construction and right of way costs.

## SUMMARY OF CONSTRUCTION COSTS

In Project Report No. 17, previously referred to, there is tabulated a "Summary of Construction Costs on Ten Individual Streams". This tabulation is the basis of the estimates contained on Page 9 of the circular widely distributed by the Citizens General Water Advisory Committee entitled "Water Conservation Project—Information Regarding the 1934 Well Replenishment Project, Santa Clara Valley Water Conservation District, published under the auspices of Citizens General Water Advisory Committee, Election June 19, 1934. There is no substitute for water." In the letting of contracts for construction, it has been deemed advisable to group certain of these streams together and costs have been kept on the combinations. Thus, the Calero Reservoir, Almaden Reservoir, and Almaden-Calero Conduit have been combined into the Almaden-Calero Unit. Also the proposed work on Los Gatos, Penitencia, Campbell, San Tomas, Calabazas, and Permanente Creeks has been grouped herein under the heading of "Streambed Improvement Projects." This includes the Vasona Dam and Canal. The following table summarizes the estimated cost of the project by units or divisions both as given in Project Report No. 17, and in the Water Advisory Committee's circular, and as now estimated for completion:



CALERO DAM

| UNIT | Estimated total costs in 1934 Well Replenishment Project Report including Rights of Way | Present Estimated total cost including Rights of Way |
|---|---|---|
| COYOTE, including Coyote Dam, access Road & Reservoir and Coyote Canal | $ 631,000 | $ 960,000 |
| ALMADEN-CALERO, including Calero Dams & Reservoir, Almaden Dam & Reservoir, Almaden-Calero Conduit and necessary road relocation | 869,000 | 993,000 |
| GUADALUPE, including Guadalupe Dam and Reservoir and necessary road relocation | 350,000 | 376,000 |
| STEVENS, including Stevens Creek Dam & Reservoir and necessary road relocation | 479,000 | 447,000 |
| STREAMBED IMPROVEMENT PROJECTS, including Vasona Dam and Canal and Percolating Works on Minor Streams | 354,000 | 307,000 |
| TOTALS | $2,683,000 | $3,083,000 |



VASONA DAM

There is tabulated below a summary of the liabilities and assets of the District as of March 10, 1936. This shows a total of current and accrued liabilities of $359,563.98 and $518,631.92 additional required to make the project workable, with but $138,890.47 on hand, $299,305.43 expected eventually from the Public Works Administration and $40,000.00 estimated salvage, leaving a deficiency of $400,000.00 to complete the project. The balance of the Federal Grant now earned is nearly ample to wipe out all costs incurred to date.

CONDENSED STATEMENT OF OBLIGATIONS, FUTURE REQUIREMENTS AND PROBABLE INCOME

| | | | | |
|---|---|---|---|---|
| **Obligations and Requirements:** | | | | |
| A. Present Obligations now due and unpaid: | | | | |
| (1) Due Contractors and Engineer | | | $ 54,461.00 | |
| B. Retention, Contract No. 2 due 4-2-36 | | | 139,313.16 | |
| C. Payment, Contract No. 5 | | | | |
| (1) Retention to 3-10-36 due 8-1-36 | $ 128,992.50 | | | |
| (2) Partial Payment on material due 8-1-36 | 36,797.32 | | 165,789.82 | |
| D. Estimated Additional Funds Required for: | | | | |
| (1) Coyote, including Coyote Dam, Access Road and Reservoir and Coyote Canal | | | 163,690.86 | |
| (2) Administration, Engineering & Legal Expenses | | | 36,135.32 | |
| (3) Rights of Way (Estimated by Rt. of Way com.) | | | 165,079.24 | |
| (4) Additional State Filing Fees | | | 4,000.00 | |
| (5) Miscellaneous Construction, including Streambed Improvement, Percolating Works and Road Relocation | | | 74,726.50 | |
| (6) Allowance for Unforeseen Contingencies | | | 75,000.00 | $ 878,195.90 |
| **Probable Income:** | | | | |
| A. Balance in Improvement Fund | | | 138,890.47 | |
| B. Estimated Salvage from Rights of Way | | | 40,000.00 | |
| C. Federal Grant | $*673,000.00 | | | |
| Less Receipts to date | 373,694.57 | | 299,305.43 | |
| D. DEFICIT (to be met by Sale of Bonds) | | | 400,000.00 | $ 878,195.90 |

* This is the amount of the PWA grant approved in the Government Contract of August 27, 1934, it being assumed that the additional contruction costs herein, for labor and materials, will result in the District earning the balance of the grant.

## OPERATING RESULTS

During the first year of construction on the project, the season of 1934-35, the rainfall was exceptionally well distributed, including very beneficial and unusually late, heavy rains. The District's percolating works had been completed and were in use, so that with the total inflow into the Valley of about 99,000 acre feet, but 28,500 acre feet was wasted. This present season, however, the bulk of the runoff was concentrated during two and one-half weeks of continuous precipitation. The District's two largest reservoirs, the Coyote and the Calero, were not yet complete, so it was not possible to use them to their full efficiency. Nevertheless, the Government's gaugings indicate that had it not been for the reservoirs, approximately two-thirds of the water supply for this season to date would have been wasted.

The most important thing to realize is that during the prolonged flood stages of February, when most of this season's runoff was concentrated, the waste in the entire Valley amounted to only 31% of the seasonal runoff, whereas it would have amounted to 68% had there been no storage. Due to the storage, the amount of this concentrated period of runoff, which has and will be made useful, will be 69%, and would have been but 32% had it not been for the control exercised by the reservoirs on most of the principal streams. These figures check rather closely with the general engineering conclusions prior to the construction of the reservoirs, that without control about two-thirds of the water supply is wasted and one-third used, whereas with control two-thirds is used and one-third wasted.

The reservoirs were operated very satisfactorily and all of them stored a considerable amount of water during the month. In February the total amount of runoff amounted to 87,070 acre feet, of which 33,200 acre feet, or 38%, remained in storage at the end of the month and 53,870 acre feet, or 62%, entered the District and was measured at the gauging stations on the various streams. Of this 53,870 acre feet that entered the District, 51% was used and percolated.



PAGE DAM

The following table summarizes the distribution of the total season's water supply to February 29, 1936 (from October 1, 1935), most of it originating in February:

## STREAM FLOW ENTERING DISTRICT, RESERVOIR STORAGE USE AND WASTE IN THE PERIOD

October 1, 1935, to February 29, 1936

| Stream | Total Water Supply Acre Feet | Storage at End of Feb. Acre Feet | Inflow to District Acre Feet | Use Acre Feet | Waste Acre Feet | Used and Stored Acre Feet |
|---|---|---|---|---|---|---|
| Penitencia Cr. | 3,941 | | 3,941 | 2,424 | 1,517 | 2,424 |
| Coyote Cr. | 49,196 | 25,000 | 24,196 | 7,976 | 16,220 | 32,976 |
| Almaden Cr. | 7,488 | ** 4,050 | 3,438) | ) | | |
| Guadalupe Cr. | 4,594 | 2,650 | 1,944) | +15,197 ) | 6,909 | 21,897 |
| Los Gatos Cr. | 18,216 | o 750 | 18,216) | ) | | |
| San Tomas Cr. | 373 | | 373 | * 1,034 | 831 | 1,034 |
| Campbell Cr. | 3,067 | | 3,067 | 2,760 | 307 | 2,760 |
| Calabazas Cr. | 351 | | 351 | 263 | 88 | 263 |
| Stevens Cr. | 4,201 | 1,575 | 2,626 | 2,597 | 29 | 4,172 |
| Permanente Cr. | 638 | | 638 | 634 | 4 | 634 |
| Small Streams (Est) | 5,800 | | 5,800 | 5,189 | 611 | 5,189 |
| TOTAL | 97,865 | 33,275 | 64,590 | 38,074 | 26,516 | 71,349 |

* Including water from Vasona Canal in February.
** 2000 A. F. in Almaden and 2,050 A. F. in Calero.
o Not included in total. Measured as flow into District.
+ This use decreased by 1,492 Ac. Ft. because of transference of water to San Tomas Creek.

Continuous weekly well measurements have been made to determine the effect of the present and the last season's water conservation on well levels. Both of these seasons to date are about normal. The water plane for the past fifteen years prior to the District's beginning of operations had been going down about 6 feet per year. It is now going up at a much greater rate. To facilitate the study of well levels, the District is divided into three main divisions, as follows:

| | | |
|---|---|---|
| 1. The areas directly affected by the percolating works of the Coyote, Guadalupe-Almaden and Los Gatos Creeks | 23.3 sq. miles | 12.5% |
| 2. The area in the lower portion of the Valley, formerly artesian | 49.0 sq. miles | 25.5% |
| 3. The central portion of the Valley, comprising the bulk of the District | 117.7 sq. miles | 62.0% |
| | 190.0 sq. miles | 100.0% |

The steady operation of the percolating areas builds up vast underground water mounds which, during last year, had been built up to a volume of about 100,000 acre feet, the average rise in the wells in this area being about 50 feet. Just as soon as the stream flow ceased, the artesian area dropped down very sharply, the ground water mounds flattened out gradually until the beginning of new runoff in 1936, but as they flattened out they held up the central or main portion of the District so there was comparatively little mid-summer drop, the average low point reached in the central portion of the District being but 5 feet below the high point and at least 10 feet higher than the low point of the previous year.

On March 15, 1936, the average water level in the ground water mounds was 7.6 feet higher than at the same date of the previous year, and the average water level in the main or central portion of the Valley was 12.2 feet higher.

Even though some stored water had to be wasted in the uncompleted Almaden and Coyote water shed, THERE IS STILL SUFFICIENT WATER IN STORAGE TO KEEP THE MAIN STREAMS OF THE VALLEY SUPPLYING THE PRINCIPAL PERCOLATING AREAS UNTIL MID-SUMMER, AND THE WATER AT THE PRESENT TIME IN ALL PORTIONS OF THE VALLEY IS HIGHER THAN IT WAS ONE YEAR AGO AND RISING FASTER THAN AT ANY PREVIOUS TIME SINCE RECORDS HAVE BEEN KEPT.

## RECOMMENDATIONS

I recommend immediate completion of the construction works as described herein, in order that the District's main works may be operated to full efficiency the coming and following seasons.

Respectfully submitted,

FRED H. TIBBETTS, Chief Engineer.

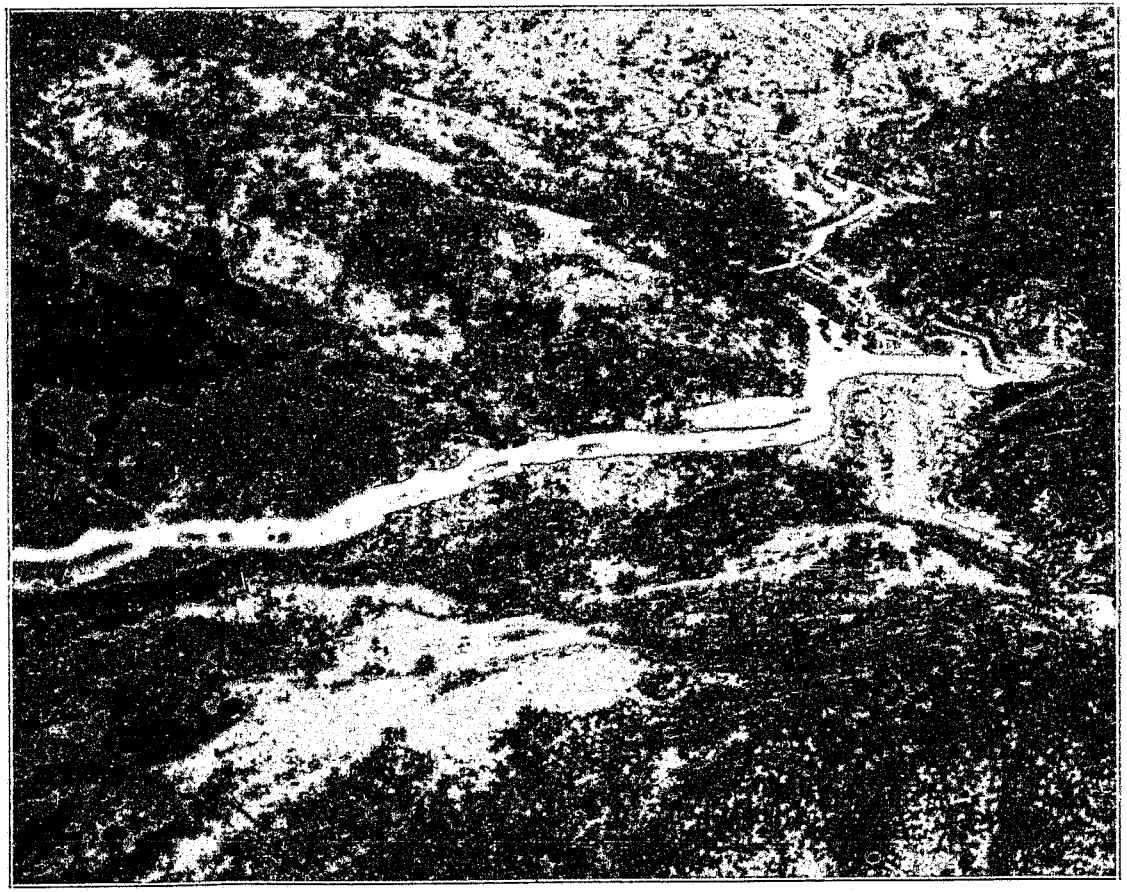
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The above report was officially approved and adopted by the Board of Directors by resolution adopted March 26, 1936.

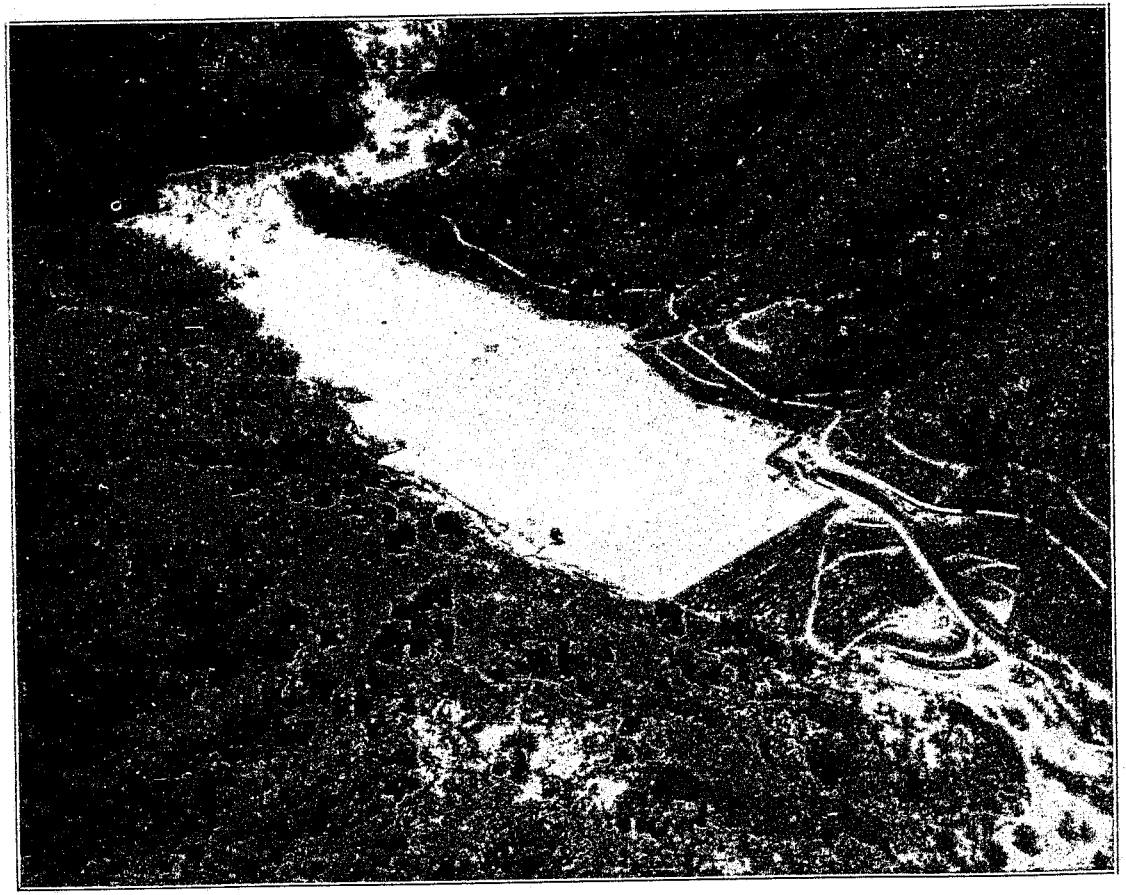
S. D. FARRINGTON
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Board of Directors

ATTEST: LEROY ANDERSON, Secretary.



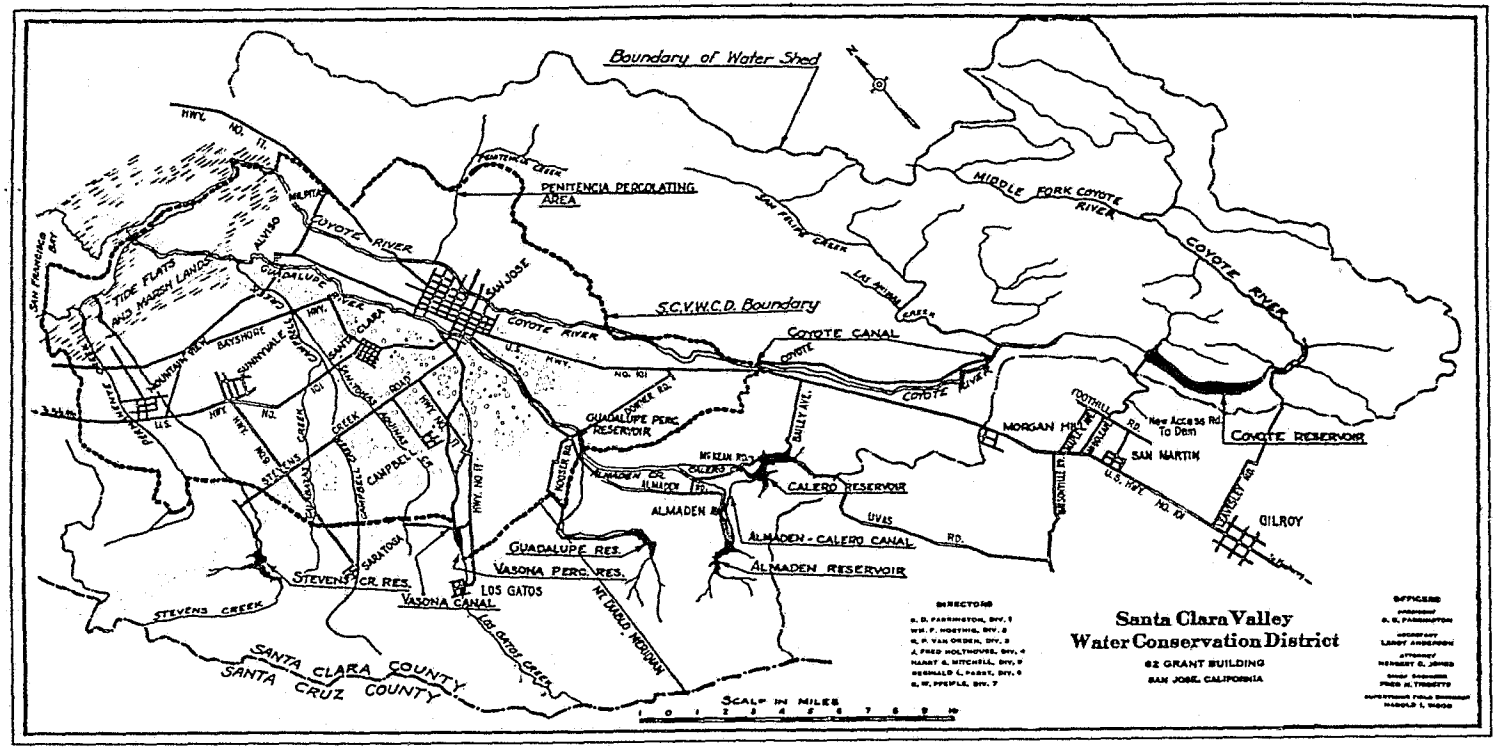
ALMADEN RESERVOIR



GUADALUPE RESERVOIR



COYOTE RESERVOIR


Boundary of Water Shed
PENITENCIA PERCOLATING AREA
COYOTE RIVER
MIDDLE FORK COYOTE RIVER
COYOTE RIVER
S.C.V.W.C.D. Boundary
COYOTE CANAL
COYOTE RIVER
COYOTE RESERVOIR
SAN MARTIN
MORGAN HILL
GILROY
GUADALUPE PERC. RESERVOIR
CALERO RESERVOIR
ALMADEN RESERVOIR
ALMADEN - CALERO CANAL
GUADALUPE RES.
VASONA PERC. RES.
STEVENS CR. RES.
VASONA CANAL
LOS GATOS
STEVENS CREEK
SANTA CLARA COUNTY
SANTA CRUZ COUNTY
SAN JOSE
TIDE FLATS AND MARSH LANDS
SAN FRANCISCO BAY
Santa Clara Valley
Water Conservation District
62 GRANT BUILDING
SAN JOSE, CALIFORNIA
DIRECTORS
OFFICERS
SCALE IN MILES

# SANTA CLARA VALLEY
# WATER CONSERVATION DISTRICT

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